APPENDIX E

SITE-SPECIFIC HEALTH AND SAFETY PLAN

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SITE-SPECIFIC HEALTH & SAFETY PLAN
333 ELLIOTT AVENUE PROJECT
SEATTLE, WASHINGTON

This Site-Specific Health & Safety Plan (SSHSP) has been prepared for Shannon & Wilson personnel performing project-specific activities associated with the 333 Elliott Avenue project, located at 333 Elliott Avenue West in Seattle, Washington (Figure 1). This plan addresses specific health and safety requirements for the excavation and off-site disposal of creosote-contaminated soil at the site. All Shannon & Wilson field personnel must understand and adhere to the requirements of this SSHSP.

1.0 SCOPE OF WORK

The objectives of the project are to remediate site soil and groundwater in accordance with the Cleanup Action Plan (CAP) prepared by Environmental Partners, Inc. in 2002, which is part of the Consent Decree signed by the property owner and the Washington Department of Ecology (Ecology), as well as redevelopment of the property. To achieve these project objectives, cleanup activities at the site will consist of excavation and associated dewatering, off-site disposal of contaminated soil, treatment and discharge of dewatering fluids, and collection of confirmation, protection, and performance samples. Contaminants of concern (COCs) for the site identified in the CAP include total naphthalenes and carcinogenic polycyclic aromatic hydrocarbons (cPAHs). The COCs are generally found in the soil approximately 10 feet below ground surface (bgs) on the south end of the site.

Shannon & Wilson personnel will be present to observe the excavation and removal of contaminated soil from the site. After the excavation has reached the depths indicated in the CAP (18 feet bgs across the majority of the site and 24 to 30 feet bgs in the suspected source area on the south end of the site), the excavation shall be examined for evidence of contamination, and if appropriate, excavation of additional soil shall be removed as directed by the on-site Shannon & Wilson representative. Performance soil sample analysis and appropriate field-based soil characterization will guide this additional excavation.

Once the limits of the excavation have been reached, confirmation soil samples will be collected from the sidewalls and floor of the excavation. These confirmation soil samples will be used to assess the extent of contamination left in place at the Site boundaries following excavation, if any.

Groundwater at the site is contaminated with cPAHs and naphthalenes. The highest detected concentrations of these chemicals at the site in May 2005 were 960 micrograms per liter (μg/l) total naphthalenes and 0.411 μg/l combined toxic equivalency factor (TEF) Modified cPAHs. Water withdrawn during dewatering activities at the site will therefore require treatment prior to discharge to the combined sewer.

The excavation will be dewatered using a series of wellpoints with estimated flow rates ranging from 1 to 10 gallons per minute (gpm). The estimated total groundwater discharge from the site dewatering system could range from about 300 to 400 gpm, possibly requiring 90 wellpoints. Excavation dewatering fluids will be collected and treated to remove settleable solids and the COCs. It is expected that some of the product will be present as dense non-aqueous phase liquid (DNAPL).

Treatment of the dewatering fluids will include a weir tank to remove settleable solids and DNAPL, oil/water separators to further remove NAPL, a filter (bag or cartridge) to remove fine suspended solids, and granular activated carbon vessels to adsorb remaining COCs. Water samples will be collected at various points in the treatment process to monitor the effectiveness of the system, to maintain compliance with applicable discharge permits, and to properly schedule replacement of "spent" activated carbon. Normal operation requires replacement of the carbon when it is no longer removing the COCs as efficiently as needed. The King County Metro Sewer discharge screening (instantaneous) and total daily limits for the COCs are:

Naphthalene	Screening level: 3.75 mg/L	Daily limit: 0.2 pound/day
cPAHs	Screening level: None	Daily limit: 200 mg/day[1]

The water treatment system will require daily inspection of various units, including the settling tank(s), oil water separators, and particle filters. Daily maintenance of this equipment may require manual removal of contaminated debris or DNAPL. Solids removed from the water

[1] The daily limit for cPAHs is for the total sum of the concentration of all cPAHs, not a TEF modified sum value.

treatment system must be handled and disposed of in the same manor as contaminated soil excavated from the site. Product will be stored in properly labeled drums pending export from the site.

2.0 ORGANIZATION AND RESPONSIBILITIES

Shannon & Wilson expects its employees to follow the policies and procedures set forth in this document and its Corporate Health and Safety Program. Employees at all levels of the organization are covered by this requirement and shall not disregard and/or alter policies or procedures because they do not think they apply. In certain cases, deviations to a policy or procedure may be appropriate, but any changes must be justifiable and documented. Changes to this SSHSP will be made only with prior approval of the Health and Safety Officer (HSO).

The goal on this project, as on all Shannon & Wilson projects, is to experience zero injuries and to remain in full compliance with applicable federal, state, and local health and safety requirements. Accountability for employee safety and health on this project is defined in the following sections.

2.1 Project Manager

The Project Manager has the ultimate responsibility to ensure that the Shannon & Wilson task work on this project conforms to contract specifications and that all project activities involving Shannon & Wilson personnel are conducted safely. The Project Manager can order field activities to be suspended if he/she feels that the project or personal safety might be jeopardized by not doing so.

2.2 Site Safety Officer (SSO)/Shannon & Wilson Field Representative

The SSO, who may also be the Shannon & Wilson field representative on site, is responsible for ensuring that the SSHSP is being followed by all on-site Shannon & Wilson personnel. The SSO will be responsible for confirming that all Shannon & Wilson personnel working on site are current in the health and safety training requirements for this project, conducting perimeter and personal air monitoring for naphthalenes and cPAHs, and enforcing the requirements of the SSHSP. The SSO will have the delegated authority to order any Shannon & Wilson person or worker on the site to follow the safety rules outlined herein and to remove that person or worker

from the site if he/she does not follow these rules. The SSO will be current in 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training, in accordance with Washington Administrative Code (WAC) 296-843. He/she will also be trained in the appropriate rescue procedures for the site and the use of the specific safety equipment. The SSO will be present at all times during the excavation and loading of contaminated soil.

2.3 Health and Safety Officer (HSO)

The Shannon & Wilson HSO is responsible for reviewing and approving this plan to ensure that it meets the regulatory requirements prior to project startup. The HSO also serves as the advisor on health and safety issues to the Project Manager and is a resource to Shannon & Wilson field personnel. The HSO will perform regular field inspections during the course of the program to ensure that the policies and procedures outlined in the SSHSP have been implemented and that Shannon & Wilson field personnel are adhering to them. This officer will be responsible for evaluating the air monitoring data to determine if additional engineering or personnel protective controls are needed to protect Shannon & Wilson on-site personnel.

If conditions change or unexpected events occur during the cleanup activities, the HSO must approve any proposed changes to the SSHSP or modification of any procedures that will affect the health and safety of the Shannon & Wilson field personnel prior to its implementation in the field.

2.4 Field Coordinator

The Shannon & Wilson field coordinator will be responsible for scheduling trained, qualified personnel to work on the project. He/she will oversee the collection and submittal of project samples and will be the point of contact if a scheduling conflict arises.

2.5 Shannon & Wilson Field Personnel

Only trained, experienced, Shannon & Wilson field personnel will be used for this project. All personnel on site will be required to review and understand this SSHSP. When two or more Shannon & Wilson personnel are working on site, a daily safety meeting will be held in which health and safety issues, such as site access and chemical and physical hazards, will be discussed. Topics discussed and attendees at the safety meeting will be documented daily on the field form located in Appendix A. They will also attend the Contractor's site orientation prior to beginning

work on the site. They will also comply with the Contractor's safety and health requirements for the site (i.e., minimum personal protective equipment to be worn), as necessary.

3.0 JOB HAZARD ANALYSIS

Chemical and physical hazards associated with this site cleanup and expansion project are discussed in this section. Both the chemical and physical hazards, along with established controls to minimize these hazards, are summarized in the job hazard analysis, Table 1. The primary hazards associated with the project include exposure to contaminated media and physical hazards associated with similar construction projects. This SSHSP and the procedures and requirements herein are only applicable to Shannon & Wilson field personnel; the Contractor and subcontractors are required to develop their own health and safety plan.

3.1 Previous Investigations/Studies

Characterization of the site has occurred in several stages with combined efforts from Shannon and Wilson, Inc. and other environmental consultants from 1996 to present. The project site is well characterized for all COCs. The studies conclude that shallow soil on site, which is generally fill, does not appear to be impacted with COCs. However, the native soil underlying this fill contains very high concentrations of coal tar creosote and its associated compounds. The highest concentration of contamination is generally between 20 and 25 feet bgs, and seems to be highest towards the southern portion of the site.

3.2 Chemical Hazards

Based on history of the project location, it is possible that an inhalation hazard or direct contact hazard may exist with respect to creosote-contaminated soil and/or groundwater during the cleanup activities. Existence of naphthalenes and cPAHs in the soil found on site suggests the contamination on site to be from coal tar creosote (rather than wood-creosote), as they are common constituents of this product. In this report, total naphthalenes refers generally to naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. Further, cPAHs refers generally to benzo(a)pyrene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)anthracene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene. The Occupational Safety and Health Administration (OSHA) exposure limits for coal tar creosote volatiles is inclusive of the naphthalenes and cPAHs found at the project location. OSHA has set a personal exposure limit

(PEL) of 0.2 milligram per cubic meter (mg/m^3) for creosote volatiles during an 8-hour workday. Both groups of compounds are found on the Special Health Hazard Substance List due to being carcinogenic. It is possible that fuel oil contamination exists in the soil on site as well. However, the levels found were very low, and precautions taken for the cPAHs and naphthalenes will be sufficient to protect personnel from possible exposure to fuel oil.

3.2.1 Preventing Exposure

To minimize personnel and public exposure to volatized contaminants found on site, Shannon & Wilson representatives must be aware of workspace and site perimeter contaminant concentrations. Perimeter and personal air sampling will be conducted to obtain an 8-hour time weighted average (TWA) of the airborne concentrations of contaminants. In addition, a photoionization detector (PID) will be used to obtain real-time measurements of volatiles in the air to ensure that Shannon & Wilson field personnel are not exposed to elevated levels of volatile organic compounds (VOCs). While working in areas designated by the HSO to be contaminated, personnel will wear a National Institute for Occupational Safety and Health (NIOSH)-approved full-face or half-face respirator with NIOSH-approved splash protective safety glasses. Respirators will be equipped with NIOSH-approved organic vapor/P100 filter cartridges, which will be changed out on a daily basis. All personnel working in the contaminated area will wear protective outer clothing that is impermeable to free-product creosote and/or fuel oil. This includes but is not limited to gloves and boot covers.

Decontamination areas will be established for personnel to remove their protective clothing and wash their face and hands thoroughly prior to leaving the contaminated area. No outer clothing or shoes worn in the contaminated area will leave the site. Receptacles will be provided for placing protective clothing that was worn inside the contaminated area. Contaminated clothing or disposable sampling equipment collected in the receptacles will be disposed with the contaminated soil. As an added precautionary measure, Shannon & Wilson field personnel should try to perform their work duties upwind of the excavation operations. Eating, drinking, or smoking will be allowed only in designated areas of the site away from the contaminated soil excavation and load-out areas.

3.2.2 Action Levels

The Contractor may need to take proactive steps, in addition to requiring appropriate personal protective equipment (PPE), to ensure the health and safety of site personnel and the surrounding community. These steps could include instituting engineering controls to disperse vapors, stopping work in the area where the concentration of contaminants exceeds the action level, or increasing PPE requirements of personnel in the area. The action level for the project is 0.1 mg/m^3. This value is half of the OSHA legal airborne permissible exposure limit (PEL) of 0.2 mg/m^3. Keeping the action level below the OSHA PEL allows time for instituting controls *before* exposing workers to unsafe conditions.

3.3 Physical Hazards

Potential physical hazards identified for this project include working in areas of high vehicular traffic, heat stress, and hazards associated with heavy equipment, including contact with moving parts, excavating in the vicinity of electric or natural gas utilities, and potential visibility concerns due to the size of the equipment. Exposure of Shannon & Wilson field personnel to ionizing radiation or entry into confined spaces is not anticipated.

3.3.1 Traffic Hazards

Because most of the work will be performed on site where heavy equipment and vehicles will be in operation, field personnel and visitors must be extremely cautious while moving around the site. Personnel must be aware of their surroundings and should stay at least 3 to 5 feet from the perimeter of the established traffic control zones, if present.

Site workers shall maintain at least a 3-foot distance from the perimeter of the demarcated traffic control area, if possible. During the project, when personnel have to come within 3 feet of the traffic control perimeter, they must be aware of the nearby vehicular traffic and wear fluorescent safety vests.

3.3.2 Noise

The primary sources of noise will be the heavy/construction-related equipment that will be used on site. Noise exposure is anticipated to be greatest for the persons operating the heavy equipment. However, Shannon & Wilson field personnel working in the vicinity of the

equipment (defined as a 20-foot radius) may be exposed to noise in excess of the OSHA permissible levels. Unless sound level measurements or noise dosimeters document exposures below 85 decibels (A-scale) for an 8-hour TWA, hearing protection (American National Standards Institute [ANSI]-approved ear plugs or muffs) will be required at all times for Shannon & Wilson field personnel working within the 20-foot radius when heavy/construction-related equipment is operational.

3.3.3 Heat Stress

Ambient temperatures at the site are not anticipated to be extremely high because of the time of year in which this work is taking place. However, moderate temperatures combined with PPE requirements could potentially expose one to heat stress conditions. The combination of heat generation from radiant heat, body heat, and the loss or restriction of the body's cooling mechanism (e.g., evaporative cooling) can put one at risk for heat stress.

One of the primary control measures for heat stress is to ensure that all Shannon & Wilson personnel are familiar with heat stress symptoms. These disorders, their symptoms, and first-aid measures are outlined below:

- Heat Rash: Decreased ability to tolerate heat, raised red vesicles on affected areas, and clothes that chafe. Maintain good personnel hygiene and use drying powders or lotions.
- Heat Cramps: Muscle spasms and pain in the extremities and abdomen. Rest in cool area and drink plenty of fluids. If pain persists, seek medical attention.
- Heat Exhaustion: Shallow breathing; pale, cool, moist, clammy skin; and profuse sweating, dizziness, lassitude, and fainting. Rest in a cool area and drink plenty of fluids. Get medical attention prior to returning to work.
- Heat Stroke: Red, hot, dry skin; no perspiration; nausea; dizziness; confusion; strong rapid pulse; and possibly coma. Cool victim immediately with cool or cold water. Seek immediate medical attention.

At a minimum, personnel wearing non-breathable clothing at temperatures greater than 70°F should take a break every two hours and drink plenty of fluids. The intake of an average of one quart of fluid per hour is recommended. If available, a cool or shaded rest area should be used.

3.3.4 Cold Stress

Ambient temperatures at the site are not anticipated to be extremely low because of the time of year in which the work is being performed and the typical climate for this region. However, moderate temperatures combined with a moist environment could potentially expose one to cold stress conditions.

A way to control cold stress is awareness of this physical hazard and its general symptoms. The symptoms of systematic hypothermia are exhibited as follows: (a) shivering; (b) apathy, listlessness, and (sometimes) rapid cooling of the body to less than 90°F; (c) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; (d) freezing of the extremities; and (e) death. All Shannon & Wilson personnel working on this project will be aware of the potential for cold stress and its signs and symptoms.

3.3.5 Electricity

Electrical safety will be of concern for those aboveground activities using equipment or instrumentation that is powered by electricity or the location of overhead electrical lines near the operation of construction related equipment. Electrical cords or plugs will be equipped with a ground-fault circuit interrupter. Any portable electrical equipment that may be required by Shannon & Wilson personnel to perform the required tasks will be maintained in its original condition. Shannon & Wilson personnel will perform a visual inspection of the equipment prior to use. Any damaged or defective equipment will be tagged and removed from service.

For subsurface work, underground utilities/cables must be identified and demarcated by the public utility locate service prior to the commencement of subsurface work. This is the responsibility of the Contractor or the subcontractors performing the subsurface work and therefore is not discussed further in this document.

3.3.6 Slips/Trips/Falls

Slips, trips, and falls are of concern during the cleanup and expansion project. While on site, Shannon & Wilson personnel must be aware of their surroundings and take personal care when moving about the project site. As part of their minimum PPE, Shannon & Wilson personnel will wear fluorescent safety vests whenever on site.

3.3.7 Lifting

The use of some field equipment may involve heavy lifting (estimated to be 30 pounds or more). To assure personnel safety, the following lifting guidelines will be employed by Shannon & Wilson personnel:

- If possible, use two individuals to lift heavy objects.
- Assure steady footing when lifting the load.
- Remind workers to spread their feet no wider than the width of their shoulders when lifting.
- Use only one person to give commands when team lifting.

3.3.8 Heavy Equipment Operations

Heavy/construction-related equipment also presents significant hazards to site personnel. The Contractor/subcontractor responsible for operating the heavy/construction equipment must enforce a safety program providing specific safety procedures. Shannon & Wilson personnel must be aware of the various hazards associated with the operation of the heavy/construction equipment and the applicable requirements of the Contractor/subcontractor safety program, where applicable. Specifically, personnel should never stand beside or to the rear of equipment, and should make sure to remain in the line-of-sight of the operator. Also, personnel should stay clear of any rotating equipment. Further analysis of the specific hazards associated with this equipment is outlined on Table 1.

3.3.9 Excavations/Trenches

All Shannon & Wilson personnel working in or near any excavation or trench will follow the safety program of the Contractor or subcontractor that is performing the excavation/trenching work. Only trained, experienced personnel wearing the appropriate PPE will be allowed to enter any excavation located in areas of suspect or known contaminated soil. Air monitoring prior to and during entry will be performed, and the appropriate engineering controls or PPE will be utilized, based on the results of the monitoring.

4.0 SITE CONTROL

The purpose of site control is to reduce health and safety risks to workers and the public by means of establishing work zones and control procedures. The Contractor for the project is responsible for site control. Shannon & Wilson field personnel will adhere to the Contractor's requirements with regard to site control, such as checking in with the Contractor upon arrival at the site.

5.0 PERSONAL PROTECTIVE EQUIPMENT

To protect personnel from potential health and safety hazards, minimum PPE requirements have been established for this project. These requirements do not preclude the need to conduct personal and perimeter air monitoring (see Section 6.0), nor do they preclude the need to amend PPE requirements as conditions warrant. Any amendment to the minimum PPE requirements must first be approved by the Shannon & Wilson HSO. Shannon & Wilson field personnel, at their own discretion, may increase, but not decrease, the degree of respiratory protection and PPE used.

5.1 Personal Protective Equipment (PPE) Designations

The minimum PPE requirements depend on the specific type of activity being performed. These PPE requirements are identified using designations similar to those defined by the Environmental Protection Agency (EPA) as EPA Level A, EPA Level B, EPA Level C, and EPA Level D. EPA Level A or B is not anticipated for the current scope of work. EPA Level C and D protection will be used while the cleanup and sampling activities are being performed. All PPE used by field personnel shall meet the current ANSI standards. The proper use of appropriate PPE will keep exposure and safety risks to a minimum.

5.1.1 Modified Level C Personal Protective Equipment (PPE).

- Full-face or half-mask, air-purifying respirator (NIOSH approved).
- Work uniform or, at a minimum, long pants and short-sleeved shirt
- Steel-toed boots, hearing protection, hard hat, safety glasses
- Work gloves (nitrile gloves while handling potentially or known contaminated soil or water)

- High visibility (fluorescent) traffic vest

5.1.2 Modified Level D Personal Protective Equipment (PPE)

- Work uniform or, at a minimum, long pants and short-sleeved shirt
- Steel-toed boots, hearing protection, hard hat, safety glasses
- Work gloves (nitrile gloves while handling potentially or known contaminated soil or water)
- High visibility (fluorescent) traffic vest

5.2 Task-specific Personal Protective Equipment (PPE) Requirements

Based on the location and site conditions, Modified Level C or Modified Level D PPE will provide adequate protection for Shannon & Wilson field personnel involved in the cleanup and sampling activities at the site. Guidelines for the selection of PPE to wear are presented on Table 2 and discussed below.

5.2.1 Sampling Activities

Excavation and soil/water sampling activities in contaminated areas will be performed with a minimum PPE requirement of Modified Level C. Should direct reading measurements indicate sustained contaminant concentrations above action levels (0.1 mg/m^3), an upgrade to a higher level of protection may be required. Appropriate decontamination of non-disposable equipment, tools, and personnel prior to leaving the work zone will be performed to minimize the potential for cross-contamination. Air monitoring will be performed during excavation activities using the equipment and meters discussed in Section 6.0.

5.2.2 Site Visit/Site Survey (Non-intrusive)

A minimum of Modified Level D PPE will be required for any personnel during site visits or walkthroughs. When entering any area suspect or known to have contaminated media, site personnel, inspectors, visitors, or oversight personnel will be required to use Modified Level C PPE.

5.2.3 Decontamination Activities

The minimum level of PPE required for Shannon & Wilson personnel performing decontamination activities is Modified Level D. If site conditions warrant personnel to don

higher than Modified Level D PPE, the same level of PPE will be donned during decontamination activities.

6.0 PERIMETER EXPOSURE AND PERSONAL MONITORING

6.1 Perimeter Air Monitoring

Shannon & Wilson field personnel will perform perimeter air monitoring of volatile compounds during the cleanup activities. At a minimum, perimeter monitoring will occur for the duration of the time that field observation indicates the presence of contamination. It is possible that excavation of the upper 10 feet of soil could be in non-impacted soil. The HSO will dictate when Shannon & Wilson monitoring activities will begin. All monitoring equipment will be calibrated daily. Field personnel will assess the possibility of airborne contamination migrating off site and advise the Contractor. The Contractor will be responsible for implementing adequate engineering controls to prevent this occurrence.

- "Puff Cartridge" or Summa Air Sampling Canisters
  - One or two air samples per day will be collected using a summa canister or "puff cartridge" for the first week of work in contaminated soil downwind from the excavation at the site perimeter.
  - The samples will be collected at a constant rate throughout the workday so that an 8-hour TWA value can be obtained.
  - Samples will be collected once per week after the first week of work in contaminated soil.
- Visual and Olfactory Observations: Shannon & Wilson field personnel will monitor the site constantly during working hours for evidence of airborne contamination or visible dust emissions.

6.2 Personal Exposure Monitoring

Personal air monitoring will be performed on Shannon & Wilson personnel while the cleanup activities are being performed. Monitoring will be conducted using the equipment listed below at the appropriate frequency:

- Photoionization Detector (PID)
  - The PID shall be used to evaluate workspace and soil headspace VOC concentrations.
  - The PID will be operated constantly in survey mode.
  - Areas to be surveyed include work areas where excavation is being conducted,

loading areas, and the site perimeter.

- Summa Air Sampling Canisters
  - One air sample per day will be collected using a summa canister for the first week of work in contaminated soil directly downwind from excavation activity.
  - The summa canister samples will be collected at a constant rate throughout the workday so that an 8-hour TWA value can be obtained.
  - Samples will be collected once per week after the first week of work in contaminated soil.

7.0 STANDARD OPERATING PROCEDURES

The standard operating procedures (SOPs) in this section describe the required actions common to the project. These SOPs describe precautions or procedures that are required of personnel involved in any of the field activities.

7.1 Site Guidelines

The following are general guidelines, which shall be followed by Shannon & Wilson personnel during all on-site field activities:

- If the PID or other monitoring equipment detects elevated levels of VOCs during the cleanup activities, the work may be stopped until the Contractor can implement the appropriate engineering controls to lower the detected contaminants below the action levels. Field personnel will move up-wind of the location until either the levels have decreased to normal (relative to the background reading obtained prior to the start of the project) or alternative engineering or administrative controls have been implemented to lower the levels.
- Line-of-sight will be maintained with the heavy/construction-related equipment operator.
- Personnel shall be properly trained in accordance with federal and state regulations, and copies of the applicable training certificates should be present in the support vehicle.
- Personnel shall wear the proper PPE selected for each work task.
- All PPE shall be inspected prior to and after wearing. Any defective or damaged PPE shall be tagged as prohibited for use.
- No contaminated tools or sampling equipment shall be allowed outside the immediate work area.
- No eating, drinking, chewing of tobacco, or smoking shall be allowed in areas that are known to be or are suspected of being contaminated.

- In the event PPE is ripped or torn, the damaged PPE shall be repaired, or removed and replaced as soon as possible.
- Personnel shall be alert to any unusual changes in their own condition and shall not ignore warning signs.
- The Shannon & Wilson Project Manager and HSO shall be notified IMMEDIATELY of any accidents or near misses. The Contractor's Safety Representative shall also be notified.
- Personnel shall be familiar with the site's emergency response procedures and routes of escape.
- Personnel shall remain upwind whenever possible during on-site activities and shall always note the wind direction.
- Personnel shall never climb over or under refuse or obstacles that would endanger them or others.
- Personnel shall thoroughly wash hands and face before eating, drinking, or using the restrooms.

7.2 Confined Space Entry

The anticipated work activities to be performed by Shannon & Wilson field personnel on this project will not involve entry into confined spaces.

7.3 Fall Protection

The anticipated work activities for this project will not require the use of fall protection equipment or a written plan. However, if locations are identified in the field that present a fall hazard of greater than 6 feet, personnel will notify the Project Manager and HSO and the appropriate fall protection will be implemented.

7.4 Ionizing Radiation

Exposure to ionizing radiation is not anticipated based on the planned work activities to be performed by Shannon & Wilson field personnel and the location of the site.

7.5 Electrical Safety

Overhead power lines, downed electrical wires, and buried cables all pose a danger of shock or electrocution if personnel or equipment contacts them during site operations. Electrical equipment used on site and lighting may also pose a hazard to site personnel. To minimize

potential electrical hazards, Shannon & Wilson personnel will verify that the Contractor or respective subcontractor performing subsurface excavations has contacted the public utility locating service and that buried lines in the area have been located.

Although we do not anticipate that Shannon & Wilson personnel will be involved with or perform any electrical work or will require the implementation of lockout/tag out procedures, in the event electrical work or lockout/tag out procedures are required, the SSHSP will be revised accordingly and will be provided to all Shannon & Wilson field personnel.

- If required, low-voltage equipment with ground-fault circuit interrupters and watertight corrosion-resistant connecting cable will be used on site.
- Electrical cords should be inspected daily for wear.
- Electrical cords should be placed to avoid contact by heavy equipment or repetitive wear.

7.6 Illumination

It is anticipated that all scheduled work will be performed during the daylight hours. Therefore, there should be sufficient illumination to perform the required activities. If night excavation is conducted, then illumination will be provided in accordance with WAC regulations.

7.7 Motorized Equipment

Motorized equipment includes excavators, cranes, trucks, backhoes, or similar type construction-related equipment. It is important to remember that the load being handled, dusty conditions, complicated terrain, or other equipment may obscure the operator's visibility. The following procedures have been developed to minimize and/or eliminate these potential hazards. These procedures will be followed by Shannon & Wilson field personnel while on site.

- Field personnel must make their presence known.
- Field personnel must be aware of rotating equipment and not get to close to any rotating parts/equipment. They will not wear loose clothing or jewelry and will tie long hair back.
- Field personnel will observe traffic patterns and stay out of the way (a minimum 3-foot distance from the perimeter of the established control zone must be maintained at all times).

7.8 Traffic Control

Because most of the work will be performed on site where heavy/construction-related equipment and/or vehicles will be in operation, Shannon & Wilson personnel must be extremely cautious of vehicular and heavy/construction-related equipment hazards. Personnel must be aware of their surroundings and should stay at least 3 to 5 feet from the perimeter of the established control zones. If work will be performed in locations that have a high volume of traffic, the Contractor shall implement the required hazard controls, which may include demarcation of the work area in accordance with the City of Seattle Traffic Control Manual for In-Street Work.

Field personnel shall maintain at least a 3-foot distance from the perimeter of the demarcated traffic control area, if possible. Because this distance may not be possible to maintain throughout the entire project, when personnel have to come within 3 feet of the control perimeter, they must be aware of the nearby traffic.

7.9 Hearing Conservation

During the cleanup activities, because most heavy equipment (excavators and other construction related equipment) is known to produce noise at levels greater than the OSHA limit of 85 decibels, disposable hearing protective devices shall be used by all field personnel working around these type of equipment, in accordance with Shannon & Wilson's company policy and OSHA requirements.

8.0 DECONTAMINATION

All non-disposable sampling equipment will be pre-cleaned prior to field activities and between each sample location. Disposable equipment, such as aluminum pans, stainless steel spoons, sample containers, and disposable bailers, will be considered single-use items and will not require decontamination. Decontamination of the air sampling equipment and media is not expected, since the laboratories will be supplying dedicated air sampling devices and flow meters.

Where possible, disposable dedicated sampling equipment will be used to minimize cross-contamination. If use of non-disposable equipment is required, all non-disposable hand sampling equipment will be decontaminated between each sample location by first scraping off as much of

the gross material from the outside of the equipment as possible. Then the sampling equipment will be washed and scrubbed in an Alconox wash, followed by a distilled water rinse, and a final de-ionized water rinse. Typical decontamination procedures implemented by field personnel are provided below.

- Step 1: Scrub boots with soap and water, or remove outer boot covers.
- Step 2: Remove hard-hat and wipe clean.
- Step 3: Remove gloves or any other clothing that was in contact with the contaminated media, place inside doubled, heavy-duty garbage bags or steel drums for proper disposal.
- Step 4: Depart the work area.
- Step 5: Wash hands, face, and neck before breaks and lunch.

The wash and rinse water generated during decontamination activities will be collected and placed in drums and/or in the on-site temporary Baker tank, and will be stored pending results of chemical analysis.

9.0 EMERGENCY RESPONSE AND ACCIDENT PREVENTION

In the event of an emergency, personnel shall move to the support vehicle. The SSO will notify the Contractor Safety Representative, who will evaluate the nature of the injury or emergency and will determine the appropriate actions to take. As soon as possible, the Shannon & Wilson HSO/Project Manager will be notified. Only minor cuts or abrasions should be treated on site. Medical personnel at the nearest hospital should treat all injuries greater than minor cuts or abrasions. See Appendix C for a map showing the location of the nearest hospital. Police, fire, or medical assistance can be summoned by calling 911.

Only persons certified in cardiopulmonary resuscitation (CPR) and first aid would be allowed to perform these actions. At least one of the Shannon & Wilson field personnel will be currently certified in CPR and first aid.

9.1 Emergency Equipment

Emergency equipment will be located in the Shannon & Wilson support vehicle. The equipment will be readily available in the event of an accident and all Shannon & Wilson personnel that are

working on site will be aware of its location prior to the start of work. The equipment to be available will include:

- An emergency eyewash
- An ABC-rated fire extinguisher
- First aid kit

9.2 Other Emergency Contacts

The personnel listed on Table 3 are the primary points of contact at Shannon & Wilson for health and safety related matters at the site. These personnel are also the points of contact to be notified in the event of an accident or near-miss incident.

9.3 Accident/Incident Reporting

Accidents and/or near misses shall be reported, treated, investigated, and mitigated as soon as possible. Accidents or near-miss incidents that occur on site will be reported immediately to the Contractor's Safety Representative and the Shannon & Wilson Project Manager/HSO. If a Shannon & Wilson employee is involved in the accident, the employee shall complete the Accident/Incident Field Report form located in Appendix B within 24 hours of the event occurring, or if the employee is incapable of completing the form, the Project Manager shall complete it. The HSO will investigate the accident or near-miss incident and document the findings. Where applicable, the HSO will communicate the findings to the Contractor's Safety Representative for follow-on action (i.e., removal of the hazard or demarcation of the area to minimize the chance of a recurring accident). Within 24 hours of completing the investigation, the HSO will notify the Project Manager and applicable field crew with the findings.

10.0 TRAINING

It is Shannon & Wilson's policy to require field personnel on site to have completed the applicable training for the tasks to be performed as required by the applicable WAC regulations. All personnel entering the site shall receive site-specific Hazard Communication training and shall be familiar with this SSHSP. In addition, they will be required to participate in the Contractor's safety orientation program prior to starting work on site. Site-specific training shall include at least the description of chemical and physical hazards associated with the project; site control, monitoring, and standard operating procedures that are applicable to the project; location

of emergency response equipment; accident/incident procedures; and the location of the nearest hospital. Shannon & Wilson personnel involved in the observation of the excavation activities and collection of confirmation samples shall be in compliance with HAZWOPER training in accordance with WAC 296-843. They will be trained in the purpose, proper selection, fitting, use, and limitations of PPE, including gloves, safety glasses, protective clothing, and respirators. Training requirements for site personnel will be reviewed by the Project Manager/HSO to assure compliance with this SSHSP.

When two or more Shannon & Wilson personnel will be working on site at the same time, an initial (pre-entry) safety meeting will be held prior to the start of on-site work. This safety meeting will be documented (see Appendix A), and any questions about the SSHSP will be answered. In addition, the pre-entry safety meeting will review site safety rules and prohibitions, the location of emergency equipment such as eye wash stations and fire extinguishers, escape routes, accident reporting, directions to the nearest medical facilities, how to summon medical assistance, and PPE requirements for the specific tasks. This safety training should enable site personnel to perform their work in a safe manner.

Safety meetings will be held daily and will be documented either on the Daily Safety Meeting Log located in Appendix A or in the field logbook. These meetings are conducted to review pertinent aspects of site operations and to establish safe working procedures for those operations. If the Daily Safety Meeting Log is used for documentation, all Shannon & Wilson field personnel will be required to sign the Log. If daily safety meetings are documented in the field logbook, all Shannon & Wilson field personnel in attendance at the meeting will be listed. If determined necessary, additional safety meetings will be held to address deficiencies noted or procedural improvements that could be made based on the previous day's activities. If tasks require that only one Shannon & Wilson representative is needed on site, he or she shall document in the field notebook that he/she has reviewed the SSHSP and is familiar with the hazards present at the site.

11.0 MEDICAL SURVEILLANCE

The tasks to be performed during this project may encounter or generate airborne contaminants that are in excess of established PELs or that will be toxic to human health. If air monitoring data indicate concentrations of airborne contaminants above their respective PELs, Shannon &

Wilson personnel experience symptoms of overexposure, or they are required to don Level C PPE, medical surveillance will be performed. Records of medical surveillance for hazardous waste activities as well as certifications for respirator use (if necessary) will be maintained at the Shannon & Wilson Seattle Office and will be made readily available upon request.

12.0 RECORD KEEPING

The safety and health-related records or logs required to be maintained by Shannon & Wilson personnel working on the site include:

- Training records for all personnel
- Accident/Incident reports
- SSO field and safety meeting notes
- Medical opinions/certifications for fitness for duty and ability to use PPE (if required)
- Respirator fit test records (if required)
- Air monitoring results for perimeter and personal air monitoring events
- Sample collection logs and field figures showing the approximate location where confirmation samples were collected.

These records will be maintained in the project folder at the Shannon & Wilson Seattle Office. Copies of air monitoring results, training records, and field notes will also be kept in the Shannon & Wilson support vehicle.

TABLE 1
JOB HAZARD ANALYSES

ACTIVITY: Excavation & Soil Sampling REVIEWED BY: JMD

PRINCIPLE STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
1. Observation of contaminated soil excavation activities.	General health and safety	Ensure that Shannon & Wilson personnel on site have reviewed and understand the contents of the Shannon & Wilson Site-Specific Health and Safety Plan. Communicate chemical & physical hazards to all field personnel. Assure that qualified trained personnel are performing the fieldwork. Check in with the Contractor upon arrival on site.
	Trips and falls	Keep work areas free from debris, tools, and field equipment.
	Contact with equipment	Keep clear from the rear and sides of the rig or equipment. Be aware of your surroundings and the location of equipment.
	Established control zones	Make sure established control zones are known and personnel are aware of perimeter distances.
	Noise	Use hearing protection.
	Electrical hazards	Locate all utilities prior to drilling operations (to be performed by others).

TABLE 1
JOB HAZARD ANALYSES

ACTIVITY: Excavation & Soil Sampling REVIEWED BY: JMD

PRINCIPLE STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
2. Collect Soil Samples	Contact with rotating machinery, cables, pulleys, etc.	Wear no rings, loose-fitting clothes, straps, draw strings, etc.
	Contact with potentially contaminated soil	Wear appropriate personal protective equipment, including nitrile gloves. Allow no eating, drinking, or smoking within the contaminated soil work area.
	Noise	Use American National Standards Institute-approved hearing protection.
	Fires and/or explosions	Store fuel in approved containers. Provide an appropriate fire extinguisher on the equipment and within the Shannon & Wilson support vehicle. A first aid kit must be in the support vehicle.
	Electrical hazards	Locate all utilities prior to subsurface work (to be performed by others.) Maintain a safe distance from overhead power lines per Occupational Safety & Health Administration regulations.
	Trips and Falls	Exercise care when working next to the excavation sidewalls. Remain at least 3 feet excavation edge.
	Traffic/established control zones	Make sure control zones are established and personnel are aware of perimeter distances.

TABLE 1
JOB HAZARD ANALYSES

ACTIVITY: Excavation & Soil Sampling REVIEWED BY: JMD

PRINCIPLE STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
3. Obtain soil samples/field screening of soil.	Contact with potentially contaminated soil.	Wear appropriate personal protective equipment, including nitrile gloves.
4. Decontaminate equipment.	Contact with potentially contaminated soil or contaminated decontamination solutions.	Wear appropriate personal protective equipment, including nitrile gloves. Care will be exercised by employees.
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. Heavy Equipment	As required by the Contractor/Subcontractor Health & Safety Plans.	The Shannon & Wilson Site-Specific Health and Safety Plan will be reviewed by Shannon & Wilson field personnel. The Contractor/Subcontractor is responsible for ensuring their operators are qualified and personnel are trained.
2. Air monitoring sample collection devices	Insure devices are not damaged prior to use.	The Health and Safety Officer will provide instructions on how to operate sample collection devices.
3. PID/Drager Tubes	Calibrate daily, where required.	The Site Safety Officer will read and follow manufacturer's instructions.

TABLE 1
JOB HAZARD ANALYSES

ACTIVITY: Water Sampling REVIEWED BY:

PRINCIPLE STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS
1. Obtaining Water Sample	Contact with potentially contaminated sampling equipment or groundwater. Fall hazards	Stand up wind of the installation activities and wear the appropriate personal protective equipment, as specified in the Shannon & Wilson Site-Specific Health and Safety Plan. Follow appropriate fall protection requirements and use the in place stairway and walkways on the tanks.
2. Lower disposable bailer into tank.	Contact with potentially contaminated sampling equipment or groundwater.	Splash protection such as goggles, gloves, and boots will be worn.
3. Collect sample into pre-preserved sample bottle.	Splash acidified water on personnel.	Splash protection such as goggles, gloves, and boots will be worn.
4. Sample packaging.	Back strain.	Handle heavy sample coolers using two people.
5. Handle investigation-derived waste drums (if required).	Back strain.	Use proper drum handling procedures and equipment.
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
1. Disposable bailer/submersible pumps.	None/electrical connections.	None/properly operate of the pump.
2. Photoionization Detector/Water Quality Meters.	Calibrate daily.	Read instrument instructions and follow them.

TABLE 2
PERSONAL PROTECTION GUIDELINES

	Respirator Type	Contaminant Concentration	Action Level Criteria Concentrations [(a)]
Modified Level D	None	0 ppm VOCs	Sustained workspace readings of 0 ppm VOCs
Modified Level C	Half- or full-face air purifying respirator with combination organic vapor-HEPA cartridges	Up to Action Level ($0.1 mg/m^3$)	Greater than 0 ppm (above upwind background levels) but less than ($0.1 mg/m^3$) for 1 minute in employee breathing zone. Or as dictated by SSO
Modified Level C	Full-face air purifying respirator with combination organic vapor-HEPA cartridges	Above Action Level ($0.1 mg/m^3$)	Greater than ($0.1 mg/m^3$) for 1 minute in employee breathing zone.

Notes:

(a) It is assumed all field activities will be performed in atmospheres containing no greater than 12 ppm for hydrogen sulfide and in oxygen-safe conditions. Measurements made in the field with a photo ionization detector (PID).

(b) Exceeding $0.2 mg/m^3$ (sustained) causes a stop-work action until levels return to normal.

HEPA = high efficiency particulate air filter

ppm = parts per million

TABLE 3
PRIMARY CONTACTS/EMERGENCY NOTIFICATION LIST

Contact	Name	Phone Number
Police/Fire/Ambulance		911
Hospital	Harborview Medical Center	(206) 731-3074
Health and Safety Office	Shannon & Wilson, Inc.	(206) 632-8020
Site Safety Officer	Cody Johnson	(206) 695-6677
Project Manager	Cody Johnson	(206) 695-6677
Field Coordinator	Cody Johnson	(206) 695-6677